DETAILED ACTION

1. This Office Action is response to applicant's Amendment, filed 07/14/2009, in which the applicant cancels **claim 7**, amends **claims 1** and **8-9** and provides arguments for patentability over the prior art references.

Response to Amendment

2. The applicant's amendments to **claims 1** and **8-9** have been considered and entered. It is noted by the examiner that the current amendments substantially change the scope of the limitations of the claims as previously presented.

Response to Arguments

3. Applicant's arguments, see Remarks of 07/14/2009 with respect to the prior rejections of the claims have been fully considered and are persuasive. The previous rejections of **claims 1-2**, **4-6** and **8-9** have been withdrawn in view of the current amendment.

Allowable Subject Matter

4. **Claims 1-2**, **4-6** and **8-9** are allowed.

5. The following is a statement of reasons for the indication of allowable subject matter.

Regarding **claim 1**, Dejaco (US Patent 6,620,990; cited previously) discloses an apparatus for trans-coding between CELP type codecs having different bandwidths, comprising:

- a first type converting means for receiving formant parameters from the input bit stream and converting formant parameters from the type specified in the input CELP format to a suitable type for a formant bandwidth conversion (Fig. 6, item 610A; Fig. 7, item 702; Col. 7, lines 11-14);
- a formant parameter translating means for translating formant parameters from input CELP format to output CELP format and generating translated formant parameters in an output CELP format (Fig. 5, item 502; Fig. 7, item 702; Col. 2, lines 45-49; Col. 7, lines 16-19);

- a formant parameter quantizing means for receiving the translated formant parameters and quantizing the translated formant parameters (Fig. 5, item 506; Fig. 7, item 712; Col. 2, lines 45-49; Col. 6, lines 55-57; Col. 7, lines 16-19);
- an excitation parameter translating means for translating excitation parameters from input CELP format to output CELP format and generating excitation parameters in an output CELP format (Fig. 6, item 630; Col. 2, lines 49-53; Col. 6, lines 04-08); and
- an excitation quantizing means for receiving the translated excitation parameters and quantizing the translated excitation parameters (Fig. 5, item 506; Col. 6, lines 60-62).

Dejaco further renders obvious the limitation of the excitation parameter translating means to receive the frame rate-corrected formant parameters from the formant frame rate converting means before the translated formant parameters are quantized by the formant parameter quantizing means. The order of the operations for the translation and quantization is not known to be a relevant factor in the direct results of the teachings of Dejaco. The examiner contends that therefore one of ordinary skill in the art could rearrange the order of operations to obtain predictable results. One of ordinary skill would have the motivation to attempt to rearrange the order of the operations for the

purpose of determining a configuration of the invention which results in an optimal processing speed. Therefore, the examiner contends that it would have been obvious to one of ordinary skill in the art to implement the teachings of Dejaco in an alternate order of operations in order to realize the optimal processing implementation.

Dejaco additionally discloses an excitation parameter translator that includes an excitation synthesizing means (Fig. 6, item 606; Col. 8, lines 25-31) and a codebook searcher (Fig. 6, item 608; Col. 7, lines 07-08; Col. 8, lines 32-34).

Cho (US Patent 6,208,958; cited previously) discloses a pitch determination apparatus that includes a formant bandwidth conversion [extension] unit (Fig. 2, element 210; Col. 1, line 61 – Col. 2, line 05; Col. 2, lines 63-65) for the purposes of extending formant bandwidth.

Arslan (US Patent 6,615,174; cited previously) discloses formant bandwidth compression [reduction] by direct adjustment of line spectral frequencies (Col. 9, lines 01-03) for the use in transcoding ("transforming a source signal into a target signal"; Claim 1).

Kao (US Patent 5,371,853) further discloses interpolation of parameters to construct a corresponding perceptual weighing filter [generating impulse responses for perceptual weighting filter based on correlated input speech data] (Col. 6, lines 10-15, lines 32-37). Kao additionally discloses that said perceptual weighting filter is fed input comprising excitation parameters [short term speech information] (Fig. 4, elements 65, 69; Fig. 5; Col. 6, lines 09-22).

Kao further renders obvious the limitation of the excitation signal having the bandwidth of the output CELP format because it would be known to one of ordinary skill in the art that in any transcoding system, any intermediate step within said system would likely operate upon data formatted using either the bandwidth of the input or the output signal. Furthermore, the examiner contends that it would have been known to one of ordinary skill in the art how to implement an intermediary step using either an input or output bandwidth with predictable successful results. Because there are a finite number of options with regard to the implementation of the system with predictable successful results, it would have been obvious to one of ordinary skill in the art to attempt either implementation because a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp.

Arslan further discloses the reduction of formant bandwidth by direct adjustment of line spectral frequencies, including a decimation method (use of "bandwidth adjustment ratio"; Col. 9, lines 06-15). Because the decimation is achieved using a bandwidth adjustment ratio, it would be obvious to adjust the ratio to achieve an interpolation [expansion] of formant bandwidth.

However, none of Dejaco, Cho, Arslan, or Koa properly discloses that the formant bandwidth converting means expands the bandwidth of the formant parameters by extrapolating input line spectral frequency (LSF) coefficients into new LSF coefficients that span

the bandwidth of the output CELP format to generate the bandwidth-corrected formant parameters, nor do these references properly disclose the limitation of the formant bandwidth converting means compresses the bandwidth of the formant parameters by truncating the input LSF coefficients from a bandwidth span of the output CELP format to generate the bandwidth-corrected formant parameters.

As noted above, the combination of Arslan and Koa are the most relevant references found in the prior art, but neither reference particularly teaches the requirements of the new LSF coefficients effectively spanning the bandwidth of the output CELP format in generating new bandwidth-corrected formant parameters.

Similarly, Choi (US Patent 6,871,176) discloses extrapolation of parameters in expanding LP coefficients into LSF parameters, but does not include the necessary limitation that said LSF coefficients...span the bandwidth of the output CELP format. Additionally, Choi is completely silent with respect to the required limitations of compressing bandwidth of the output formant parameters.

None of the other prior art found appropriately addresses these limitations as required by the claims in combination with the other limitations. Therefore, for at least the above reasons **claim 1** comprises allowable subject matter and is allowed.

Regarding **claims 2** and **4-6**, each of these claims is dependent upon allowed **claim 1** and merely further limits the scope of the same. Therefore, these claims each comprise allowable subject matter and are allowed for the same reasons as applied above to **claim 1**.

Regarding **claims 8-9**, each of these claims is directed to an alternative embodiment of **claim 1** under a different statutory category of invention, and comprises limitations similar to **claim 1** that are allowable in combination with the remaining limitations. Therefore, **claims 8-9** are allowed for the same reasons as applied above to **claim 1**.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Wigran (US Patent 5,351,338) discloses a time variable spectral analysis based on interpolation for speech coding.
- Gao (US Patent 6,757,649) discloses a codebook table for multi-rate encoding and decoding with pre-gain and delayed-gain quantization tables.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Kovacek whose telephone number is (571)270-3135. The examiner can normally be reached on M-F 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Supervisory Patent Examiner, Art Unit 2626

DMK, 10/29/2009